Quantum Oscillations and Superconductivity

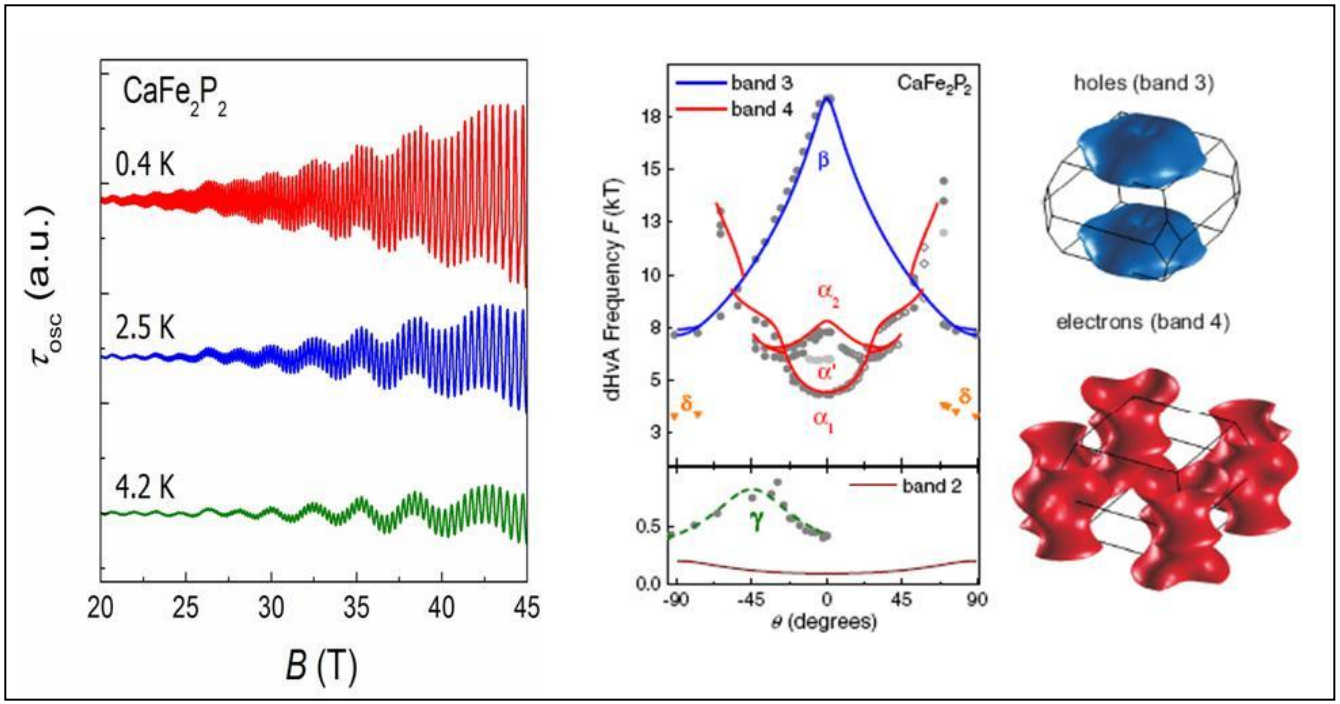
Gregory S. Boebinger, National High Magnetic Field Laboratory

DMR-Award 0654118

DC Field User Facility User Program

Recently a new class of superconductors was discovered that exhibits high temperature superconductivity, the “pnictide” superconductors. High magnetic fields reveal quantum oscillations that provide unique information about the electronic properties of a material.

Researchers from Bristol University (UK), Stanford University, and the Magnet Lab have found that the *non-superconducting* compound $CaFe_2P_2$ has an electronic structure with key differences from the closely related *superconducting* compound $SrFe_2P_2$ and other superconducting pnictides. The difference is that the nonsuperconducting compound has a smaller ratio of atomic spacing along its *c* axis than along its *a* axis (c/a). This causes the electronic structure to be much more three dimensional in character than related superconducting compounds and provides important clues about the nature of high-temperature super-conductivity in the pnictides.



Coldea, A.I.; Andrew, C.M.; Analytis, J.G.; McDonald, R.D;. Bangura, A.F.; Chu, J.-H; Fisher, I.R. and Carrington, A., *Phys. Rev. Lett.,* 103, 026404 (2009)

Quantum Oscillations and Superconductivity

Gregory S. Boebinger, National High Magnetic Field Laboratory

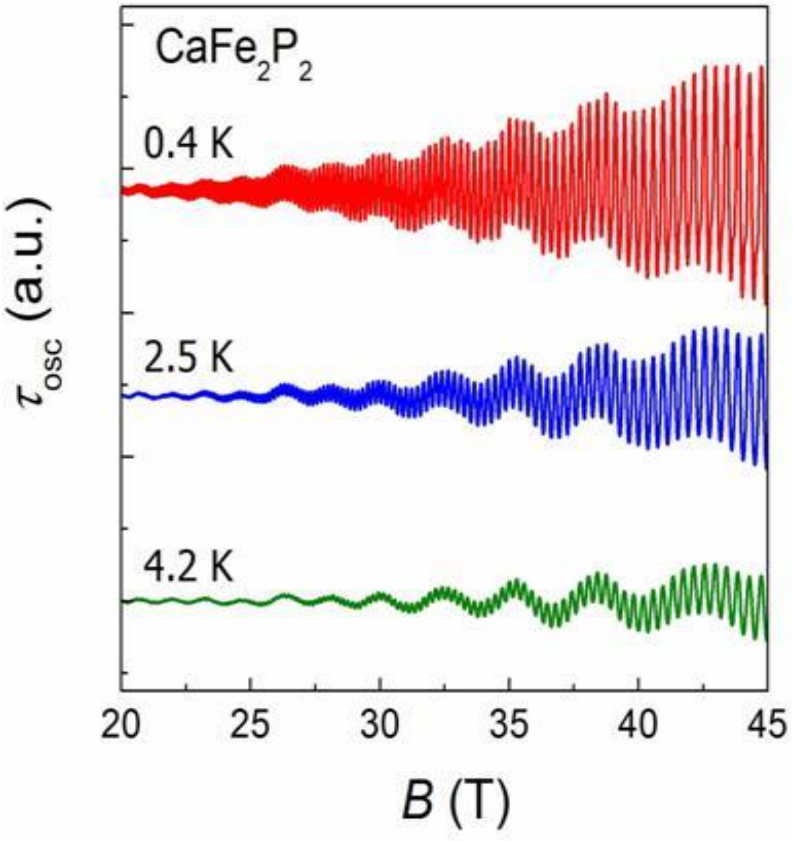
DMR-Award 0654118

DC Field User Facility User Program

Dr. Amalia Coldea
University of Bristol (UK)

The leader of this research collaboration among Bristol, Stanford and the Magnet Lab was Dr. Amalia Coldea at the University of Bristol. Samples were grown at Stanford University while high field measurements were performed in the DC Field Facility of the NHMFL in Tallahassee, FL.

This international collaboration combines the strengths of many different programs to advance our understanding of high-temperature superconductivity.



Coldea, A.I.; Andrew, C.M.; Analytis, J.G.; McDonald, R.D;. Bangura, A.F.; Chu, J.-H; Fisher, I.R. and Carrington, A., *Phys. Rev. Lett.,* 103, 026404 (2009)